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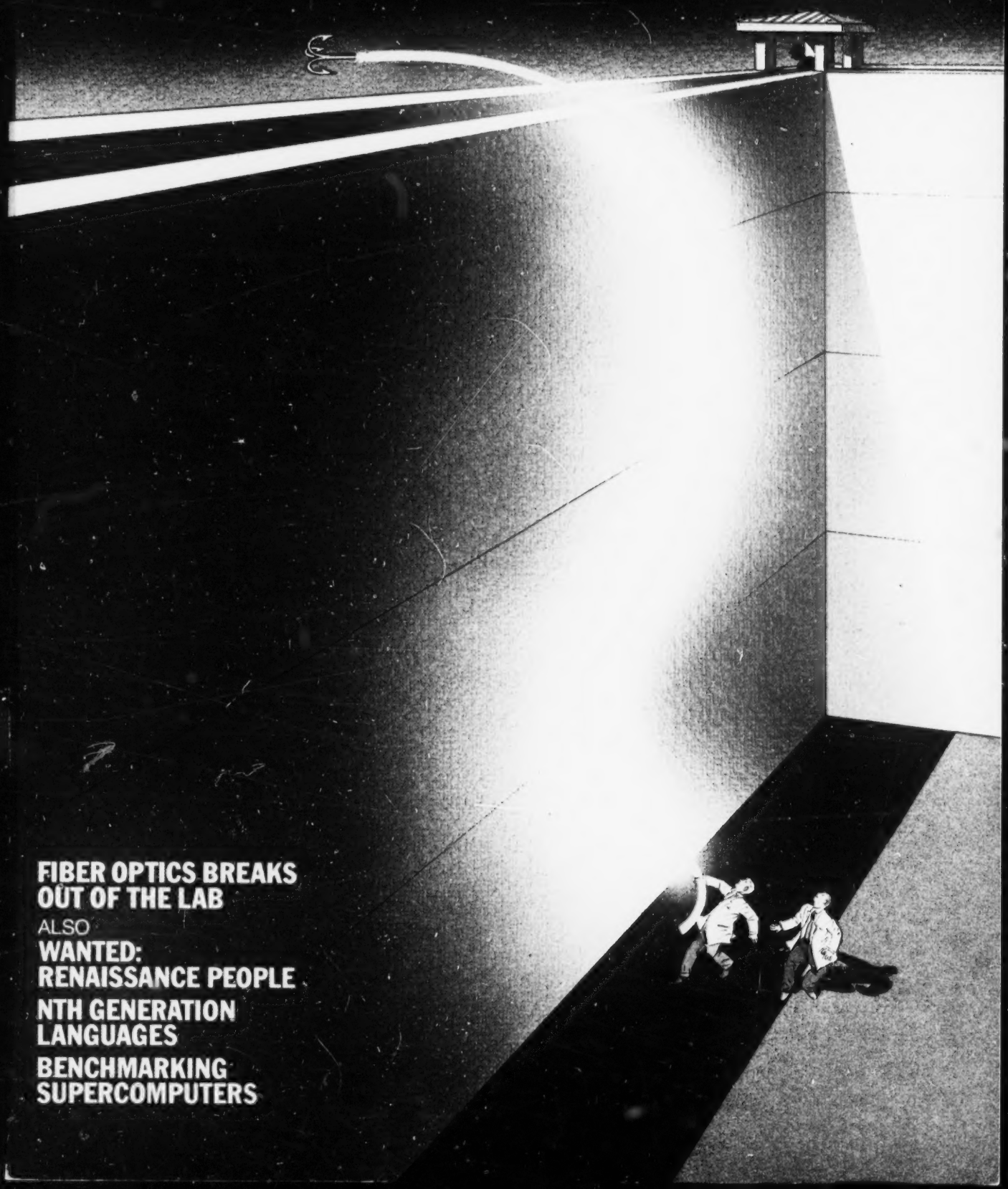

FIBER OPTICS BREAKS OUT OF THE LAB

ALSO

WANTED: RENAISSANCE PEOPLE

NTH GENERATION LANGUAGES

BENCHMARKING SUPERCOMPUTERS

DATAMATION

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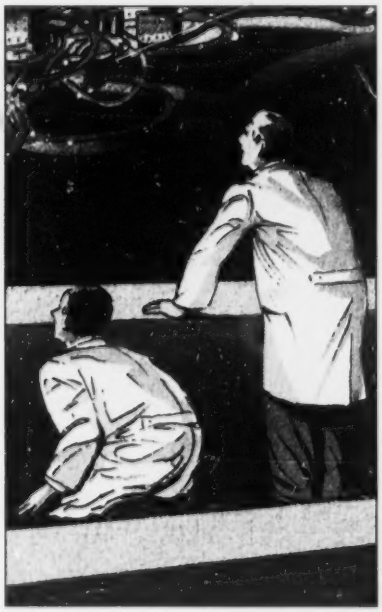

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BY ANDREA BARUFFI

IN FOCUS

BANKING ON PCs

Will personal computers save home banking?

Edith Myers

It's different strokes for different folks from the people who are bringing us home banking.

For the newest wave of offerings you need a personal computer that communicates. Together, more than 1 million people and small businesses have one or more pcs and a modem.

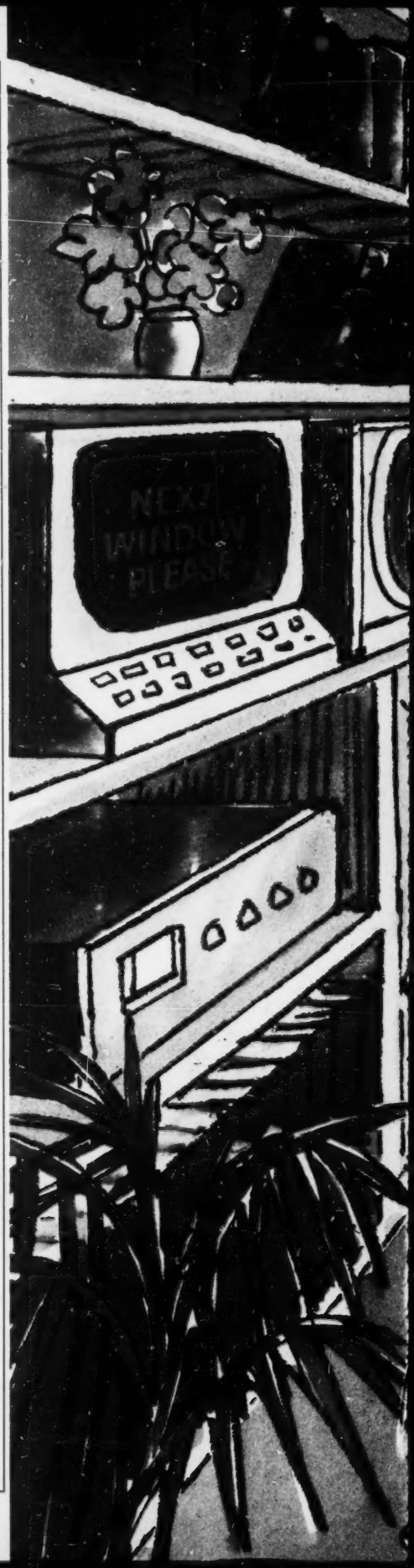
These people are ripe for the picking by such home banking institutions as Bank of America in San Francisco and Chemical Bank in New York. Nineteen financial services organizations, anxious for ways to entice customers with electronic services and simultaneously reduce back office processing costs, are flocking to join the pc bandwagon with bank-at-home offerings.

A host of software houses and service bureaus are also profiting from the pc banking trend. Among the firms who provide bank systems that link up to personal computers are Periphonics Corp., Bohemia, N.Y.; Microperipheral Corp., Redmond, Wash.; and ADP Telephone Computing Services, Seattle.

The bandwagon has its giveaway aspects. Madison National Bank of Washington, D.C., has a pc-based service, and it provides the pc—a Commodore 64 for now, but it plans to offer IBM PCs as well, beginning this month. Broker E.F. Hutton will sell or lease the hardware to access your account.

Some home banking observers, however, are skeptical of the potential in tying the cash vault to the home computer. "I don't believe what I hear about their [pcs] growth capacity," says Kenneth Thacker, president of Strategic Dimensions Ltd., a Toronto consulting firm that specializes in strategic planning for electronic banking. "I think the forecasts are made by the manufacturers." He believes offerings like the Bank of America's will "get the early rush," but not the customer who's difficult to sell to.

Camps are developing among home banking proponents who favor different types of access devices. Thacker favors videotex terminals. "The average customer doesn't want to think computer. He's more comfortable with a videotex terminal, his tv screen, and access to an



infinite number of databases."

He feels the adoption of the NAPLPS (North American Presentation Level Protocol Syntax) by the telephone company ultimately will drive down the price of videotex terminals because "manufacturers [of terminals] now have a blueprint from which to work and they'll start turning them out in quantities with resulting economies of scale.

"If you can deliver that [videotex services] for $20 to $25 a month, consumers will consider it just another add-on to their tvs," says Thacker." Yet the early returns on interest in home banking via videotex are less than encouraging.

Charlie Forbes, vice president of sales and marketing for Chemical Bank's Pronto home banking, with pc offering, quite naturally favors the pc as an access device. "The hardware is in place in the home; $600 to $900 [for a dedicated videotex terminal] is a hell of an investment for something you've never done before."

A 14-bank consortium, Home Banking Interchange, is looking at both NAPLPS videotex terminals and pcs. John Fraser, an officer of First Wisconsin National Bank, Milwaukee, one of the participants, says two tests will be conducted, one with AT&T's Sceptre terminals and a second at a later date with pcs.

The banks signed an agreement in mid-1983 with ADP to install home banking systems for them. In midsummer this year they were just about to turn on the

"The average customer doesn't want to think computer."

systems, says Fraser. The Sceptre-based systems will be tested for one year with data monitored by ADP and turned over to Mathematica, Princeton, N.J., for analysis.

Fraser says the planned pc test length has not yet been set. For the Sceptre test the banks each will lend terminals to some 100 to 125 selected customers. "For the pc test we'll be talking to people who already have them," he says. Mathmatica's final report for HBI will include a comparison of the two access modes.

Howard Phillips, president of ADP Telephone Computing Services, says that the final act in the home banking scenario will see a wide mix of access devices. "We'll have everything from rotary dial phones to Touch-Tone phones to ASCII pcs to videotex terminals to bulk feed (where banks use the services of an outside provider), and out there in the Ozarks somewhere, somebody will be using a number 10 tomato can and a string."

Thacker forecasts there will be a coming together of videotex terminals

FIG. 1

BANKING AT HOME SYSTEMS

SERVICE PROVIDER	REGION	NO. OF USERS	PROTOCOL
ADP Telephone Computing Services/Home Banking Interchange	nationwide	2,000	NAPLPS
Anacomp/Videoserv	nationwide	NM*	Prestel
Bank of America/ HomeBanking	California	8,000	ASCII
Chase Manhattan Bank/ Consumer Home Banking	New York	200	ASCII
Chemical Bank/Pronto	New York	11,000	ASCII
Citibank/HomeBase	New York	about 1,000	ASCII
Continental National Bank/ Home Banking System	Miami	200	ASCII
Empire of America, Macrotel/TransTouch	Buffalo	NM*	NAPLPS
Farmers State Bank and Trust, BankWork/Farmers Home Banking	Jacksonville, Ill.	20	ASCII
First Interstate Bank/ Day-and-Night Video Banking	Los Angeles	250	ASCII
Horizon Bancorp/ Horizon Home Banking	New Jersey	NM*	ASCII
Huntington Bank/BankShare	primarily Ohio	NM*	ASCII
Madison National Bank/ Home Teller	Washington, D.C.	300	ASCII
Manufacturers Hanover Trust/NA**	New York	NM*	ASCII NAPLPS
National Bank of Detroit, Applied Communications/ Video Information Provider	Detroit	NM*	Prestel
NCR Universal Credit Union/Companion-at-Home	national	over 100	ASCII
Penn Security Bank & Trust/People Server Videotex Service	Scranton, Pa.	50	ASCII
Shawmut Bank of Boston/ Home Banking	Massachusetts	100 NM*	ASCII
Toledo Trust/VistaBanc	Toledo area	120	ASCII
United States Trust Co./ UST Master Account	New York	70	ASCII
VideoFinancial Services, Viewdata Corp. of America/Applause	south Florida	about 850	NAPLPS

*NM: not meaningful; in startup phase
**NA: not available
SOURCE: "Teleservices Report," reprinted with permission of Arlen Communications Inc., Bethesda, Md.

and pcs. He foresees NAPLPS software that will give the videotex terminals increased capability and eventual building of NAPLPS chips into personal computers. "In five years it'll be difficult to differentiate."

He feels availability of terminals for under $100 "is essential if home banking is ever to really take off." He believes it will happen. "The question is when. We're moving that way. Remember the price you paid for your first television set? Or for your first handheld calculator?"

He's not alone in predicting growth for home banking. A study by the New York research firm Frost & Sullivan titled, "Home Financial Services Delivery Systems," predicts that one in 10 thousand households will utilize electronic home banking by 1991. Fraser of First Wisconsin expects that 10% of all households will be using it by 1990.

John F. Fisher, senior vice president of Bank One Corp., Columbus, Ohio, said at the American Bankers Association's National Operations and Automation (NOAC) conference in Washington, D.C., that the 1990s "will usher in the final development of videobanking technology, preceded in the 1980s by the initial introduction of the technology and development of the standalone home information appliance and the full network."

Home banking, however, was not the hot topic this year at NOAC. Much more attention was paid to things like shared automated teller machines (ATMs) and back office automation.

Floyd Egner, director of the Home Terminal Research Program at Reistad/PSI, Tampa, Fla. (formerly Payment Systems Inc.), says home banking "hasn't generated a lot of excitement in the last six months or so."

Chemical's Forbes believes this is because banks are giving other dp projects higher priority. "Home banking has been something that is moving more slowly than we had anticipated. Shared ATMs to a limited extent, POS [point of sale], and consolidation of back office functions are eating up technical resources."

Talk about home banking has "dragged on to a point that it's tiresome," says Henk Koehn, futurist for Security Pacific National Bank of Los Angeles. "It's going to happen but its unclear what segment of the population it will go to. There's a synergy between VCRs and home computers. [Home banking] will appeal to those types of households."

Koehn believes the ultimate providers of home banking will probably not be banks but third-party vendors. "They're selecting their partners and the first minuet is under way."

THE PC AS STOCKBUYER

Purveyors of most electronic financial services for the home are faced with educating users to doing something in one environment that they have been doing for years in another.

Not so with the independent investors. "Independent investors are very independent. They want to make their own decisions and they're used to initiating transactions from their homes and offices via telephone," says Eric Kobren, director of marketing for Fidelity Investor's Express, an interactive discount brokerage service launched last spring by Fidelity Investments, Boston. It is available to owners of personal computers and dumb terminals.

Kobren himself uses the latter. "It's a $250 Quazon [by Quazon Corp., Carrollton, Texas], which hooks up to my tv and my phone."

Most Investor's Express users, however, use Apple, IBM, and IBM-compatible computers, he says. "Heavy investors have the money to buy computers so their use is the rule rather than the exception."

Fidelity introduced the service with a price tag of $195, but in June cut back to an "introductory" price of $49.95. Kobren said the price would move back up, probably to $95, by the end of this summer. Fidelity is conducting demonstrations of Investor's Express at its 28 investment centers across the country.

Kobren won't say how many subscribers Investor's Express has, only that there are "about several hundred," and that interest has been high both in the U.S. and Europe. He says the most attractive feature to investors is the fact that they can initiate transactions 24 hours a day. "Most of our activity is at night. A lawyer can't buy and sell stocks when he's in a courtroom or a doctor when he's in surgery."

He says customers feel less independent when they buy or sell orders by phone. "Our traders don't try to influence customers over the phone, but when customers are talking to someone, they perceive that they're being talked into or talked out of something." A person placing a buy or sell order at night has the option of changing his mind right up until the market opens.

Software for Investor's Express was developed by Trade*Plus, Palo Alto, Calif., which runs it on DEC VAX computers for Fidelity. Leonard Schwartz, vice president of marketing for Trade*Plus, says his company began offering the brokerage product last year after a year and a half in development.

The first customer for the product was C.D. Anderson, a 10-year-old San Francisco brokerage firm that created a subsidiary, DeskTop Brokerage Inc., to market it not only to brokerage customers but to other brokers on a franchise basis. C.D. Anderson was the first brokerage to offer such an interactive service but DeskTop Brokerage president C. Derek Anderson doesn't feel like a wounded pioneer. "There was a thirst for this type of product," he says. "I know a lot of people who have gone out and purchased modems just to use our service and a few who have bought computers for the same reason."

When he takes the product to market to brokerage houses, probably on Sept. 15, Anderson says he will launch a nationwide promotion for the name DeskTop and he expects potential franchisers will want to take advantage of this.

Do customers ever blame the computer for erroneous transactions? Schwartz of Trade*Plus says this is less likely to happen than with telephone sales. "Brokers tell me that's a big beef with telephone buyers. The stock goes down and they claim they didn't buy. With our system you have a hard-wired trail."

Anderson said his customers make the most use of the system at night and particularly like the fact that they have access to it in case of emergency, "like war or any unforeseen positive or negative news. Usually at times like that all the phones get tied up."

Microperipheral Corp., located in Redmond, Wash., is developing its own system for on-line stock transactions. The system, to be called Stock Mate, is not up as yet. And Michael Darland, president of the company, could not say when it will be up.

The banks will be in there, too. Both Chemical Bank and Madison National Bank of Washington, D.C., have announced they will add stock transactions to their home banking offerings this year.

The stock quotation services are also getting into the act. The Source, the on-line database from Source Telecomputing Corp., McLean, Va., recently announced a deal with a Los Angeles broker, Spear Securities Inc., to supply brokerage services to the 57,000 Source subscribers.

In addition to real-time transaction and confirmation, investors can use the Source for portfolio management. Several brokerage firms are also selling their research to the databases. So far, though, computerized stock buying for the masses seems to be the realm of discount brokerages aiming at independent investors.

—E.M.

One such partnership is between CBS, Sears, and IBM, which announced early this year it would develop a videotex service. "That gives home banking the kind of credibility that will make it go," says Thacker.

Sears in June started a telephone bill paying service in Southern California which it called Stage 1 and which it plans to take national next year. Phillips of ADP says both First Interstate Bank of Los Angeles and Security Pacific are using Stage 1 terminology for their telephone bill paying services.

In mid-1983, Sears chairman Edward R. Telling told stockholders that home banking was a "top priority" for the company. "We have long felt that electronic delivery systems are extremely important to the consumer," he said at an annual meeting. "Automatic teller machines and in-home banking in various forms are a top priority for Sears."

Another major retailer, J.C. Penney Co. Inc., New York, is forming a new venture headed up by Stuart C. MacIntire, who, when he worked with First Bank System Inc., Minneapolis, was instrumental in setting up FirstHand, a home banking experiment in Fargo, N.D. Penney bought the FirstHand system and is lining up partners for a network service which undoubtedly will include home banking.

Egner of Reistad/PSI likes a consortium called Video Financial Services (VFS), which includes, among others, Honeywell, Field Enterprises, and Centel, in Chicago; Viewdata Corp., Miami Beach; Southeast Bank of Florida, Miami; Bank One Corp., Columbus; and Security Pacific. VFS, he says, does software development and transaction processing for the banks involved. It also is the switch and owns the host computer. The first on-line project is the Viewtron offering by Viewdata, a subsidiary of Knight-Ridder, in Miami. A project was being developed for summer introduction in-

"In-home banking in various forms is a top priority for Sears."

volving ASCII terminals from Honeywell that would ultimately include gateways for the use of the NAPLPS standard. Egner estimates involved partners have invested "several million dollars apiece."

Also high on Egner's list is an offering called TranstexT, announced May 31. Its parent is Integrated Communication Service, made up of Control Data Corp., GTE, NCR, Westinghouse, Southern Bell, The Southern Company (a utilities holding company), and "half a dozen smaller partners."

Key to the TranstexT offering is what Egner describes as a gray box—an elaborate meter and also a computer. "With this, a Touch-Tone telephone, and a home tv set, you have a total videotex terminal." The boxes would be installed in a garage or basement by the electric utility companies, which also would do on-line meter reading. First installations were for a beta test starting in June in Roswell, a suburb of Atlanta. It is expected to spread to 200 households this fall, all in the South. Banks involved with TranstexT include North Carolina National Bank; Charlotte Citizens & Southern National Bank, Atlanta; and Fulton Federal Savings & Loan, also in Atlanta, among others.

Egner is a firm believer that home banking as a service cannot stand alone and should be offered with other services. Phillips of ADP is not so sure. He says this is an important question for study in the Home Banking Interchange program. "Maybe people like to read their newspapers, like to go to the store. We want to find out what's important to people. Maybe our entire emphasis should be on banking."

Chemical Bank is continually adding services to its Pronto offering. In April it announced Information Services by which customers can get economic and business briefs, tax guides, *Consumer Reports* articles and a guide to all Chemical Bank services and current interest rates. This was added to the existing services of account maintenance, merchant payments, and electronic mail. At NOAC, Chemical announced it would introduce investment services on Pronto this fall (see box).

Mock of Madison National Bank says his bank will be adding discount brokerage services by the end of this year. Madison's existing services are bill paying, account balance, funds transfer, and loan applications. For the latter, Mock says, a customer can fill out an application via his terminal. "A hardcopy is turned over to the loan office which checks it out. If it's approved we call the customer to come in and sign. Maximum turnaround is five days."

Madison charges a customer $15 a month, which includes the Commodore 64. Chemical charges $12 a month for Pronto, and Bank of America charges $8 per month for its offering. "Cost is important," says Egner. "Customers want to perceive it as replacing an existing cost, say, check service charges."

John Farnsworth of the Private Banking Division of Bank of America and chairman of the Home Financial Services Committee of the Electronic Funds Transfer Association says Chemical Bank and Bank of America are the only two major banks active in the home banking market today. "Citibank's Home Base service hasn't really rolled on yet and Viewtron [the Viewdata service in Florida] is just now adding banking services." Viewtron has five banks offering some form of service through the videotex offering. A recently floated rumor in the New York press indicated that Citibank may try to refocus its home banking experiment toward small businessmen who already have a computer and want better control over their finances. *Citybusiness*, a business newspaper, predicts that new Citicorp chairman John Reed "plans to emphasize desktop services to the com-

Citibank may refocus on small businessmen who already have a pc and want better control over their finances.

mercial market. A far wider range of financial products interests the small businessperson more than the home banking customer," says columnist Daniel Burstein.

Farnsworth, who was with Chemical Bank before joining Bank of America last January and was closely involved with Pronto from its inception, compared the offerings of the two banks. "Pronto has a few additional dimensions to it for the back office end, but because of that, it suffers by being not quite as universal as the Bank of America's." The B of A service will work with virtually any personal computer. Pronto now works with Apple, Commodore, Compaq, and the IBM PC. Chemical is working slowly toward interfacing to other personal computers.

Farnsworth's committee has been in existence 18 months. "We track home banking systems that are quickly evolving all over the country. We also track legislative and regulatory matters but at this point there are no major obstacles to home banking. We want to make sure it stays that way."

What home banking services do customers like best? Mock of Madison National says that far and away it's statement display among his customers. This allows a customer to review his account activity since his last hardcopy statement. "It's used every session, every time a customer accesses the system." He says transfer of funds comes second and bill paying third. Madison has more than 350 vendors signed up to be paid via its system and is adding more all the time.

Bill paying comes in second among Pronto customers, according to Forbes. Chemical has some 1,300 merchants who can be paid and also is adding more regularly. "We'll put on anybody a customer asks for." Among Chemical's Pronto customers, balance inquiry rates number one, but bill paying is a very close second.

Madison, which calls its offering Home Teller, didn't have any problem selecting customers for a pilot program begun last fall with 100 users. "They just walked in and asked for it when we announced we were going to have it," says Mock. He says the bank began promoting the service in May and received more than 900 applications in June.

Selections for tests of home banking have come in for criticism on grounds that there is a selection bias and that often the tests are free and therefore not a valid way to evaluate a service for which charges eventually would be imposed.

Egner of Reistad/PSI, admittedly not a fan of Home Banking Interchange, feels its selection process is particularly suspect. "All members select their own groups and some are even handpicking among their employees."

Fraser, of HBI participant First Wisconsin, says each group selected a random sample of customers and from that sample selected users for the tests. "There were some parameters but we were aiming at getting people from all segments of society."

When HBI moves into its test with pcs, Fraser says, selection will be different. "We'll want people who already have pcs. We'll probably talk to user groups."

Fraser says banks participating in HBI aren't permanently tied to each other or to ADP. "At the end of the study we'll ponder the results; then each bank can do whatever it wants."

They hope the study will show the actual benefits to banks of offering home banking. Many banks feel it will appeal to high-income customers. B of A feels it will recoup the $2 million to $4 million it spent developing its service. Some check handling will be eliminated by electronic bill paying, and some teller time will be saved through electronic funds transfer and statement review.

Indeed, for many bankers the advantage of electronic services for their retail customers centers on the savings in back office costs. "Home banking is one endeavor to offset the costs of the back office," contends Ralph Watson, president of Powerbase Systems Inc., a New York-based micro software house that formerly was solely in the bank dp services business. Its staff was part of the contract programmer team that developed Pronto for Chemical Bank. "Banks have a huge cost of processing paper, and it eliminates key punching and back office paperwork."

For Mock of Madison National the biggest immediate benefit has been new customers. Of the over 900 applications Madison received after promoting Home Teller, he says 80% were from new customers.

"Out there in the Ozarks somewhere, somebody will be using a number 10 tomato can and a string."

Madison is talking licensing agreements for Home Teller to at least three other banks, but with new customer response what it is, Mock won't talk to local [Washington, D.C.] banks. "Why should I?" he asks.

Chemical has licensed eight other banks to use Pronto. They are Crocker National Bank, San Francisco; Manufacturer's National Bank of Detroit; First National Bank of Pennsylvania, Erie; Union Trust Company, Stamford, Conn.; American Security Bank, Washington, D.C.; Bankers Trust of South Carolina, Columbia; Florida National Bank, Jacksonville; and Worthen Bank and Trust Co., Little Rock, Ark. Forbes says Chemical was "talking to a number of others." He predicted in late 1983 that Chemical would sign up 50 licensees by 1985, but at midyear this year he said he would have to revise that downward somewhat.

Current Chemical licensees have what Forbes calls a Phase 1 license allowing them to work with "a couple of hundred customers through our hardware." A Phase 1 license carries a one-time price tag of $25,000 plus maintenance and per customer processing fees. Next step would be a full commercial license for $700,000 plus maintenance and processing. Again, Chemical's Tandem NonStop II processors would handle transactions. Forbes says it is not out of the question that Chemical would consider placing hardware at customer sites at a future date.

Michael Darland, president of Microperipheral Corp., says his company can put a bank into a home banking business where it can make a profit charging customers $5 per month and $3 per connect hour. He says his firm has designed an autodial/autoanswer modem that can be used with any personal computer. It's straight ASCII, he says. "NAPLPS is too costly." The terminals come in two versions, a 17-key model for $175 and a 52-key model for $250. An entire system with 16 ports sells for $86,000 and with 48 ports for $134,000.

Shuttle Corp., a Microperipheral subsidiary, has placed systems in two banks, one in Pennsylvania and one in West Virginia. Darland said in late June that the banks were still testing and didn't want to go public with their systems as yet.

Periphonics claims that more than 250 banks in the U.S. have ordered its pc linking system, which it demonstrated for the first time at this year's NOAC. The system functions with all brands and models of home computers and uses Periphonic's voice response technology, the company says. When a customer calls a bank's computer to start a banking transaction, a human voice greets the caller, asking in multiple choice fashion for the customer's brand of computer, the transaction intended, and the account and security identification code numbers. Customers respond by pushing the buttons on their Touch-Tone phones. A Periphonics official says she is unsure how many of the banks have actually implemented the pc connection.

Phillips of ADP, which is implementing the HBI tests and which offers systems for home banking via telephone or pc or a combination of both to banks in general, likes to think his company has

CARTOON BY LEO CULLUM

been into home banking since 1973. The company was started that year to provide home banking via telephone with a service called Pay-By-Phone. "We thought it would take off in two to four years but we made big mistakes. We made it too complicated." Initially, the service allowed customers to handle a variety of trasactions via Touch-Tone phones. When it was scaled back to bill paying only, it gained acceptance. He sees home banking by terminals or pcs as being in a position now of having to proceed a step at a time. "It took 16 to 17 years for consumers to accept ATMs and 25 years for extensive use of credit cards."

It all boils down to selling consumers on the idea, agree watchers and providers of home banking. "You want to make them feel comfortable," says Thacker, who before starting his own company directed electronic banking services for the Bank of Montreal, the only non-U.S. bank in HBI. B of M started a Branch of the Future one and a half years ago; it is constantly updated with new technologies, and customers can come in and play with them. Basically, it's Telidon (the Canadian videotex technology on which NAPLPS is based) married to videodisk. The bank uses a controller manufactured by Pearl Systems, Toronto, to enable its mainframe to talk to videotex terminals. Thacker has high praise for these.

Chemical Bank in early summer was sending out free demonstration diskettes to owners of IBM, Apple, Commodore, and Compaq personal computers so they could become familiar with Pronto's services. Forbes says Chemical could make these demo diskettes available for licensees for their own promotion.

He said in late June that Pronto was being used in 7,500 to 8,000 households in the New York Metropolitan area, "which translates to 11,000 to 12,000 people."

"California's about the best market for pcs. Try New Orleans and you'd be lucky to find five."

Bank of America, the other early leader, had signed up 2,000 customers by June 15 and was looking for 25,000 by year-end. Unlike Chemical, B of A has only financial services, and while it is evaluating other offerings on a continual basis, no plans have been made to add on. Since it owns discount broker Charles Schwab, the opportunity to sell stocks by computer is obvious.

In southern Florida, the granddaddy of videotex services, Viewtron, which started as a test in 1980 and went commercial in 1982, is looking for 5,000 subscribers by the end of the year but, as Farnsworth points out, home banking is a relatively new component. Egner of Reistad/PSI estimates that only 1% of Viewtron subscribers use home banking. He is a subscriber and he does not. "I'd have to go into Miami to open an account to do that."

As for the differences in input devices, Phillips, who believes there always will be differences, says it's like automobiles. "Some people need big powerful cars and others, little sports jobs."

There are those who believe services tied to personal computers will find a geographic tie to their successes. Farnsworth feels B of A's success can be attributed in part to the proliferation of personal computers in California, particularly around Silicon Valley. Thacker notes: "California's about the best market for pcs. Try New Orleans, for example, and you'd be lucky to find five."

Another worry for pc-tied home banking services is the current downgrading by analysts of predictions for the home computer market. Banking isn't going to turn this around. "Nobody's going to buy a home computer just to do banking," says Thacker. ◉

SYSTEM V

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CIRCLE 3 ON READER CARD

A new survey of dp managers reveals a more relaxed management style and a desire to hire some "know-it-alls."

WANTED: RENAISSANCE PEOPLE

by Andrew Friedman and Joan Greenbaum

In a recent in-depth survey of 95 significant data processing departments, the managers interviewed showed a keen interest in hiring generalists for programming and systems functions. As one manager put it, "We need Renaissance people, who can think and act with an open mind." Generalists, they believe, will fit better into the newly emerging, flexible team structures in which development and maintenance staff, as well as end users, work together from beginning to end of projects. The managers stressed that generalists rather than "techies," have more to contribute to data processing departments.

While user-involved teams staffed with Renaissance-like generalists might sound like a pipe dream, it represents an ideal toward which many managers are apparently working. Quite a few have already put the ideal into practice.

The managers were interviewed for a survey that was part of a four-year international project funded by the British Economic Social Research Council. Interviews were carried out with top data processing managers and/or project managers of large-scale projects at several hundred firms in five countries. The interviews, often lasting three hours or longer, focused on work organization and management strategies for software development. This article looks at the results of the American sample, drawn primarily from the *Directory of Top Computer Executives,* which encompassed departments from as small as three programmers to those employing several hundred programmers and analysts. Firms were randomly selected from the directory and other similar lists. Interestingly, the majority were application shops where COBOL was still dominant, operating in a mainframe environment (see box on p. 136). Results show:

- More than 82% of managers use team or matrix work organization as opposed to the formerly popular large programmer pools. Responding to a question about significant organizational changes over the last five years, a number of managers cited the shift from programmer pools to analyst and programmer teams as a major accomplishment.
- Almost all said they involve users in some or several aspects of software development. While this idea had been given lip service for the past several years, it now appears that users are, in fact, beginning to have their say.
- Formal sign-off procedures with higher management are less frequent than might be expected. Only about 40% of data processing managers said that they use upper management sign-offs to turn a project over to operations, and just half formally sign-off after specifications are complete.
- Demarcations between development and maintenance work appear to be fading away. Fewer than 25% of managers reported that they keep separate departments for development and maintenance functions. Systems and applications, however, are still separate entities, with over two thirds of the firms noting these as distinct departments or groups.
- While time sheets and target setting continue to be recommended methods for evaluating and monitoring software staff, over 90% of the interviewed managers have a strong preference for personal contact to supplement these traditional forms of appraisal.
- Despite the great "GO TO debate" of the 1970s, fewer than 60% of managers in predominantly COBOL shops urge their programmers to avoid GO TO statements. An even smaller number were strongly interested in enforcing any other kind of programming standard such as maximum module size, or standardized module interfaces. The comment of one DPM was typical: "Oh well, we try, but you know. . . ." Another added, "It really makes sense to be flexible about this."
- A bachelor's degree is still the main ticket into programming and systems work, but a large number of managers expressed frustration with the computer science graduates they hired and look with interest to liberal arts or business students. Many indicated that, if given the choice, they would hire from within the company, giving preference to those with demonstrated ability to work well with users and colleagues. Retraining for clerical workers and other people with experience in the company is not uncommon.

VERSATILE TEAMS THE RULE

Small, versatile project teams are the rule for maintenance work as well as new project development. In most firms, project members work on more than one project at a time and, not surprisingly, serve on more than one team at a time. As experience has shown, teams that work well together stay together. About 65% of teams stay together beyond the length of a project; in midsize departments of 10 to 29 programmers/analysts, about 75% of teams stay together longer than one project.

Three quarters of all project teams have fewer than six members. Interestingly, the older title distinctions, such as programmer, senior programmer, and analyst, don't seem important in determining team makeup. The surveyed firms most often lump programmers and analysts together.

ILLUSTRATION BY RICHARD BOBER

Many managers reported that they prefer the term "analyst/programmer" rather than individual titles, since workers function in both ways within the teams.

While the 1960s and '70s saw the rise of the programmer pool concept for large COBOL shops, particularly for maintenance, managers now appear to be pleased that they are moving away from this model. Only about 20% of the sample reported using programmer pools, a percentage that was the same for maintenance and new development work. They felt that teams and matrix structures give them the chance to organize their work force to suit the needs of a particular project, while simultaneously giving programmers and analysts more of a hand in developing or maintaining a whole project. Certainly, the cry of programmers to participate in more aspects of project development is one of the factors moving them out of pools and into more adaptable team organizations.

Formal sign-off procedures at traditional milestones in project development appear to be far less important in practice than they are in theory. When sign-off procedures are used, checking with users carries more weight than reporting to upper management. To a question asking managers to indicate at which points in project development they seek clearance before doing further work (i.e., functional specification, system specification, detailed design, coding and debugging, and testing and operations), the managers responded that they are more likely to check validity with users than they are with their corporate superiors. In either case, however, formal sign-offs are not particularly popular.

Only about half of the surveyed managers said that they formally report to higher management at the end of functional or systems specifications, while 80% of firms check the validity of functional specifications with users before continuing a project. Around 70% of managers reported that they check the validity of a system with users before it is turned over to operations. These reports directly contradict management theories about the need for formal project milestones, yet come as no surprise to managers engaged in the day-to-day details of running a project.

FIG. 1

NUMBER OF FIRMS INCLUDED IN SURVEY BY TYPE AND SIZE (95 FIRMS)

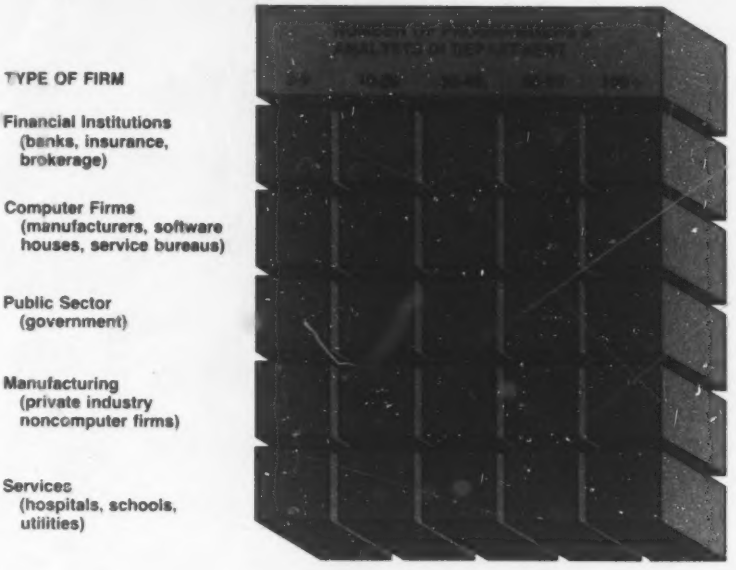
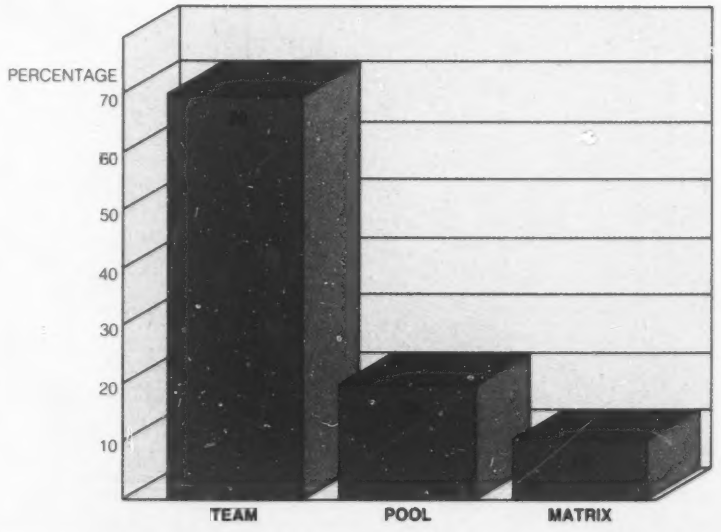

TYPE OF FIRM
Financial Institutions (banks, insurance, brokerage)
Computer Firms (manufacturers, software houses, service bureaus)
Public Sector (government)
Manufacturing (private industry noncomputer firms)
Services (hospitals, schools, utilities)

FIG. 2

ORGANIZATION OF PROGRAMMERS & ANALYSTS



(Q. 16) What best describes the organization of your development staff?

CLEARLY MARKED STAGES

Management journals have stressed the need for clearly marked stages in project development and have delineated tasks for different software specialists, but this division of labor no longer appears to be as important as it once was. Working together in project teams, systems analysts, programmer/analysts, and programmers tend to overlap in job function. Similarly, an overlap of project milestones is apparent:

- Fewer than 30% of managers said that they change personnel at sign-off points within a project, signifying the strength of project teams and the lack of clearly marked project milestones;
- Only 10% of firms change day-to-day responsibility between design and coding, perhaps a further indication that teams develop their own internal work organization.

The interviewed managers were remarkably candid. While most programmers and analysts know that "things are not done by the book," the survey is an open admission of a more relaxed attitude toward work organization.

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The questionnaire, originally developed for use in the United Kingdom, also asked if managers imposed a set of design and coding on programmers and analysts. Almost unanimously, American managers responded that they do not "impose" standards, probably reflecting the fact that this type of strict enforcement seems to go against the American self-image. Even with further questioning on this point, less than 60% of managers said that they use standards to limit GO TO statements, and a similar number admitted that they require formatted specifications for input/output and program layout. To a separate question asking if there were department standards for program specification, only half of the managers responded affirmatively.

It's hard to say whether standards are indeed enforced without much enthusiasm, or whether it has become fashionable for managers to appear relaxed in their management style. As might be expected, first-line managers and project leaders who are closer to shop-floor practices are more likely than DPMs to expect programming standards. And, it was suggested that strict enforcement was no longer so necessary, since newer programmers have been schooled in structured code and therefore don't need to have their hands held to avoid GO TO situations.

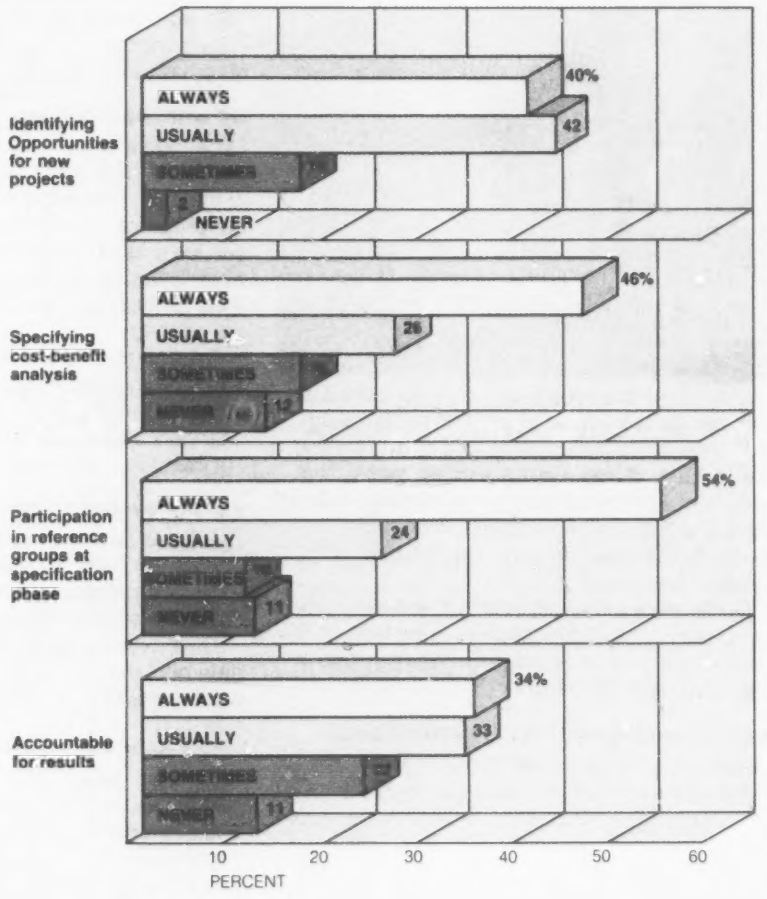
While management journals have spent the better part of the last decade hammering home the enforcement of standards, most software people know that strict adherence to rules is rare. Many managers, however, commented that they would like to see better enforcement of department programming standards. Some went as far as to say that it was a top priority for them, though overall, interviewers got the sense that management theory and shop-floor practice are strikingly different.

Management methods for monitoring and evaluating staff are also varied, but here managers appear to exert more control. Almost all use some recognized procedure for appraising individual performance, such as time sheets, work targets, and formal employee evaluation sessions. About 90% of managers said that they involve programmers and analysts in setting target dates for project phases, although most managers do not let staff pick their own projects.

On the whole, managers prefer to evaluate workers on the basis of how well target dates are met, rather than on the basis of time sheets. Many said that time sheets are merely paperwork, important for keeping upper management happy, but not particularly useful for monitoring the progress of programmers.

FIG. 3

USER ACTIVITY



(Q. 8) To what extent are users normally involved in development of new applications in their area?

Managers were quick to point out that now, as in the past, "experience and achievement are more important than a degree." Forty percent of the sampled firms indicated that they have hired programmers with less than two years of experience, but most preferred programmers with at least two years of experience under their belts.

Since many managers want to hire people who can communicate well with users, generalists are in demand. One manager explained that he would prefer to recruit "application analysts"—people with business experience who could understand users' needs and envision a whole application. While a computer science degree is still a big favorite in corporate personnel departments, many managers said that, if given their own choice, they would seek out liberal arts graduates and people interested in problem solving. Two to one, managers prefer degrees in subjects other than computer science. They stressed, however, that hiring technically proficient people is still essential.

LABOR TURNOVER STILL BIG

Labor turnover, particularly among programmers and analysts with two to five years of experience, continues to be an issue. The survey

There is a major contrast between management's actual practice and the "correct" policy of management theory.

showed that, during the last three years, large firms had a turnover rate of nearly 100% for workers in this experience bracket. With the demand for banking applications, job hopping was most common for programmers and analysts in financial firms. But mangers seemed to be less worried about job hoppers than they were in the past, apparently because the pool of possible replacements is now so large.

Because the supply of graduates far exceeds the current demand, breaking into programming is hard. While there might be a demand for Renaissance-type programmer/analysts, it certainly is not a Renaissance period for entry-level programmers.

In general, managers said that they are pleased that users are getting more involved in identifying opportunities and participating in the specification phase of projects. Many managers indicated that as users get more sophisticated, some data processing woes might ease.

But user sophistication is a double-edged sword. Some managers complained that users have increased input in defining projects, but have not accepted additional responsibility for results. In a question asking if users were held accountable for results, the overwhelming majority of DPMs said that this was rarely the case. The glory or shame that goes with a project's outcome is still the dp department's domain.

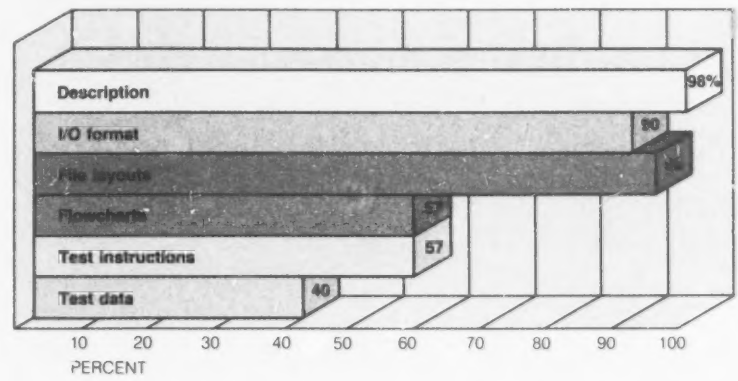
Users are almost always involved in some phase of project development, but the introduction of micros into user departments has cast many DPMs into uncharted waters. As users get micros and begin their own projects, data processing managers are sometimes called in to bail them out. In many instances, managers feel that downloading some current work onto user micros would be a good idea. A number of managers expressed delight at the idea of shedding the drudgery associated with maintenance and enhancement of existing systems, but DPMs are searching for a way to control this process. Indeed, most companies do not yet have policies for dividing work between the data processing department and user areas.

Three major firms in our sample attempt to navigate around this problem by merging user and dp functions into new groups.[1] One large insurance company integrated its claim processing applications for one contract type under the auspices of a combined dp/user management team. A very large bank did the same thing with a number of functions, continuing a trend that has affected banks for several years. And a major computer manufacturer took all of its internal corporate functions and reorganized them into 10-person dp/user teams. These teams combined programmers, analysts, and user-specialists under data processing managers. What is unique in these instances is not the fact that users are involved in dp activities, but rather the way in which user activities have become part of the dp department or group. Whether these become models for moderately sized firms will be worth watching for as users gain pc power.

We see a major contrast in this survey between management's actual practice and the perhaps outdated "correct" policy of management theory. Rather than pursue "direct control"[2] over the data processing

FIG. 4

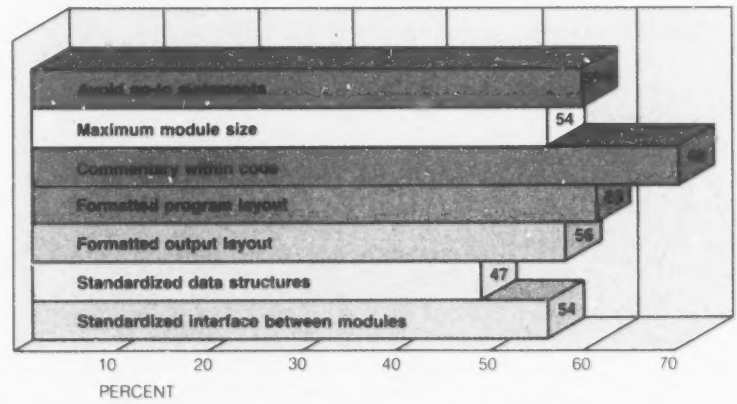
SPECIFICATION STANDARDS



(Q. 28) Of the firms requiring standards specifications, the above represent the percentage of firms including this documentation in their specifications.

FIG. 5

DESIGN & CODING STANDARDS



(Q. 27) Do you impose any (of the above) design and coding standards in your department?

[1]Since the lengthy questionnaire contained some sensitive questions, all 95 firms in the U.S. sample were promised anonymity.

[2]"Direct control" and "responsible autonomy" are terms used in Andrew Friedman's book Industry and Labour. The responsible autonomy style was identified in other work settings.

Sophisticated users will be both boon and bane for the data processing professional.

task assignment, data processing managers have been developing a culture of "responsibility autonomy," in which employees are given considerable responsibility over their work and are expected to perform well over a wide range of work tasks.

DP LABOR DIVISIONS BLURRED

The detailed results of the survey reveal a blurring of traditional boundaries in the division of data processing labor. The emphasis on programmer/analysts as central figures in the organization is interesting: while traditional titles and job ladders still bear much weight, management relies more and more on workers who do some of both. We found, for example, that 95% of the time management expects that the person doing the coding will be involved in writing the specifications as well. Rather than parcel out pieces of work, assembly-line fashion, managers prefer to control task sizes by informal guidelines. Thus, standards like "maximum module size" or "expected lines of code" were rarely viewed as important in shaping the progress of a project.

Team organization may offer programmers and analysts more opportunity to see a project from conception through to implementation. Managers believe that there is more assurance that a job will be done well if the participants are more fully involved. Clearly, teams give management the flexibility to move staff around where needed. Seventy-four percent of teams were found to be working on more than one project at a time. This is clearly where generalists and Renaissance people fit in. Amidst a shifting landscape where the only certainty is constant change, programmers who can function as analysts and communicate with users are welcome assets.

User involvement in areas that have traditionally been data processing strongholds is speeding evolution. Both the programmer/analyst structure and team organization are flexible and responsive to the user onslaught. The generalist is yet another figure who can help the data processing department adapt to change. A pattern of informal guidelines and flexible standards is strengthening the image of a data processing work organization that is prepared for change.

From the survey, we see the development of a management culture of responsible autonomy in which flexibility is achieved through careful adaptation. Managers are discarding their traditional watchdog role. They are prepared to exchange direct control of staff and the work process for the flexibility they need in order to retain their balance in the shifting corporate picture.

Within this almost idyllic scene, the shape of future problems is evident. Sophisticated users, with manuals in hand, will be both boon and bane for the data processing professional. Offering users new services, while relinquishing control over some existing prerogatives, will be a difficult parlay. Another problem will be posed by the employee trained in computer science. Technicians geared toward elegant solutions will have difficulty understanding the unstructured problems posed by the new setting.

And finally, new forms of communication will be crucial among expanding data processing departments and new user groupings within the organization. The flexibility that the British Economic Social Research Council study revealed to exist in the organization of data processing departments may, however, save the day. ◉

"Say, where the hell did *that* come from?"

CARTOON BY SIDNEY HARRIS

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The survey was conducted in the summer of 1983 through the International Computer Occupations Network (ICON). ICON project members in New York included Christine D'Onofrio, Persephone Flood, Karen Edwards, Michael Jacobs, and Joe Kirshner. The authors wish to acknowledge the special contribution of Michael Jacobs to the compilation of this article.

NOTE

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84-86, 88, 93-94, 96, 98,

100, 133-134, 138, 140, 144.